



ES9733-L

## Look Up, There's a Table

### The demystification of Lookup Tables in Revit Families

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#### Learning Objectives

- Learn how to create own lookup tables
- Learn how to implement lookup tables into your Revit families
- Learn how to use the parameters in your families
- Discover the use cases and limitations of lookup tables

#### Description

In this hands-on class you will learn the basics of how to use lookup tables (Revit 2015 software and above) within your families.

#### Your AU Experts

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## Introduction

This class will start with the basics on how lookup tables need be created to make them working. Then we will go further to implement lookup tables into your families and of course see how they are going to work in your project.

As the right definition of the table and the formula to make them usable in your family needs some understanding there will be a mixture between explanation and doing (Hands-On).

## How to create your own lookup table?

To know how to create a lookup table you first need to know the basics.

### How does a lookup table look like?

First of all.... It just looks like any other table:

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									

This Format fits perfectly what you're going to achieve with a lookup table.

You would fill the columns with the information you want to have and the rows with the values that correspond to each other.

An easy example of such a table could look like

	A	B	C	D	E	F
1		Input1	Input2	Output1	Output2	Output3
2						
3						
4						
5						

### Structure for Columns

Looking at the example above you have different types of Columns.

#### Column A - Numbering

The first column in a lookup table is always just for you to structure your table. This usually is just a Numbering and it won't affect anything. Make sure that you don't name this column, as the csv-file won't work if this (A1) isn't blank.

#### Columns B & C - Input

In this example these lines are regarded to be values that are driven from instance parameters out of Revit. To make it easy to understand for the start I called them *Input1* & *Input2* but of course they could



have ANY Name like *Diameter & Angle* or *Size & Length*. Depending on the scenario you might have only one Input value or you might have three or more.

**Columns D, E, and following - Output**

After the columns with the input you will have as many output-values as you need to have. You should take care on the naming of those since their names will be used within the Revit Family formula. So keep them simple!

**Using the right Syntax**

Now that you know how to structure the table itself it's time to learn about the syntax you need to use. Revit is using a .csv file for import. Revit allows you to separate columns by

- comma “,”
- semicolon “;”
- colon “:”
- stroke “|”

This is not essential during you create your table with the help of Microsoft Excel, but saving as .csv you should check what you haven chosen as separator.

The first row is not only defining the names for the columns, it also sets which kind of parameter you are using and what the units of this parameter are. Therefore each single field in the first row needs to follow this syntax:

```
ParameterName##ParameterType##ParameterUnits
```

**ParamterName:** could be any Name you want to have. Remember, keep it simple!

**ParameterType:** Acceptable parameter types are: NUMBER, LENGTH, AREA, VOLUME, ANGLE, and OTHER

**ParameterUnits:** millimeters, meters, feet, inches, square\_feet, cubic\_feet degrees, etc.

So your empty lookup table could look like this:

	A	B	C	D	E	F
1		Input1##length##millimeters	Input2##length##millimeters	Output1##length##millimeters	Output2##length##millimeters	Output3##angle##degrees
2						
3						
4						
5						

Documentation on that could be found in [Revit 2016 Online help](#).

**Filling Information into the table**

This task is as easy as it sounds. You only need to know what your values are. If you are trying to create a part following a product catalogue, just take the table from there and type it into your spreadsheet. Since the parameters already define what the column is about you only need to enter the values (No Units).

In this example I want you to have a quick learning experience and therefore we just create a cube that's adjusting it's thickness (Output1) according to it's length (Input1) and width (Input2).

	A	B	C	D	E
1		Input1##length##millimeters	Input2##length##millimeters	Output1##length##millimeters	
2	1	1000	1000		15
3	2	1200	1000		16
4	3	1000	1200		16
5	4	1200	1200		18
6	5	1200	1400		20
7					

If you want to use imperial sizes on this. Feel free to do so.

Saving this as a csv file should give you this result in text editor:

```

1 ;Input1##length##millimeters;Input2##length##millimeters;Output1##length##millimeters
2 1;1000;1000;15
3 2;1200;1000;16
4 3;1000;1200;16
5 4;1200;1200;18
6 5;1200;1400;20

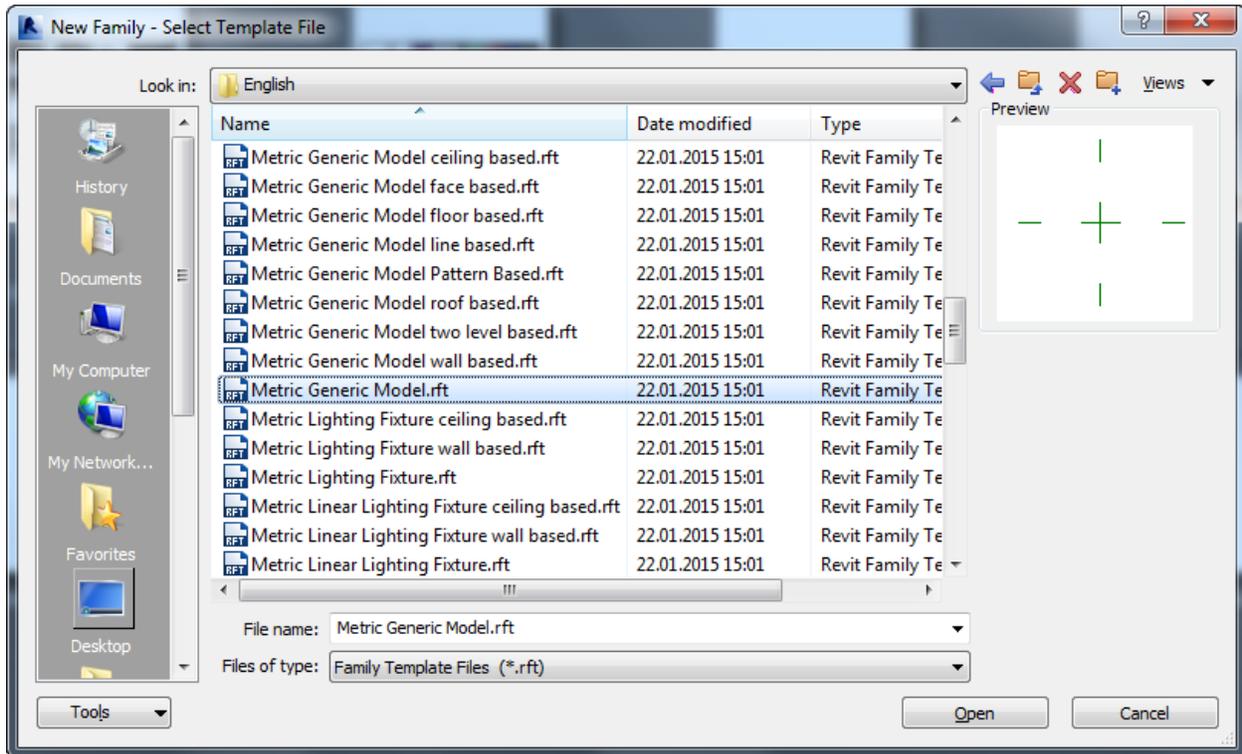
```

To make sure everything works fine, check if the first line starts with a separator (as you put nothing at the A1 field in Excel).



## Implement lookup tables into your Revit Families

As you now understand what a lookup table looks like it's time to get this into Revit. First step is to create a new Family (or use an existing one). I use the metric generic model.rft for this purpose:



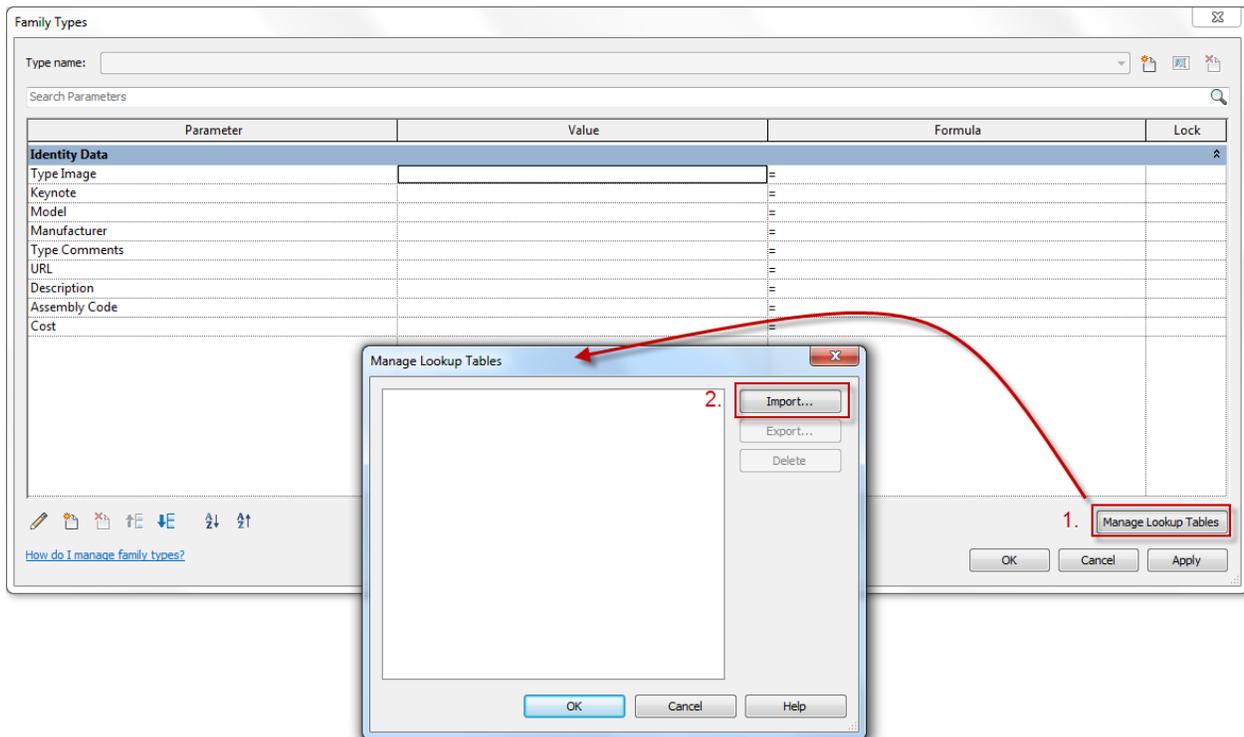
## Loading the lookup table into your family



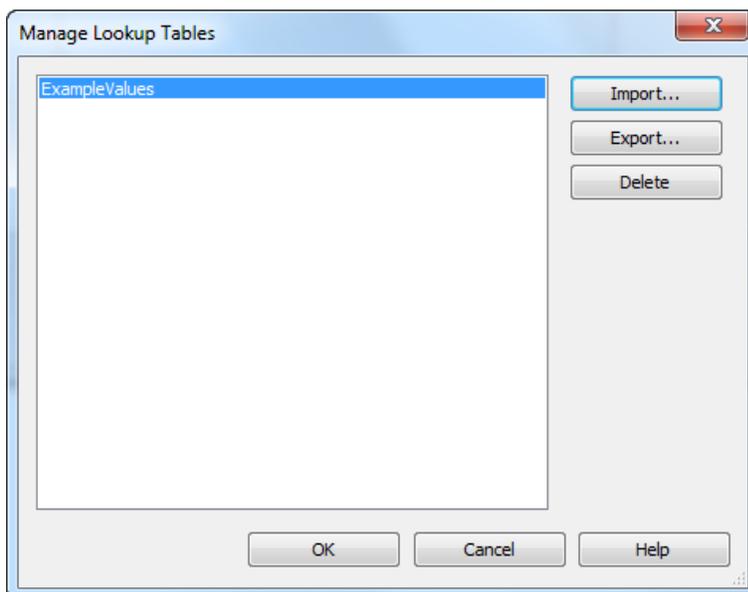
To load the csv file into your family you need bring up your family types dialog

Depending if you have Revit 2016 R2 Release or previous Version on your machine this will look slightly different, but this won't affect the way lookup tables work.

## Look Up, There's a Table—The demystification of Lookup Tables in Revit Families



Pick *Manage Lookup Tables* to import the csv file into your family.



When the Table shows up you can select OK.

The Name shown in Manage Lookup Tables is also the Name that needs to be used in Revit later on.

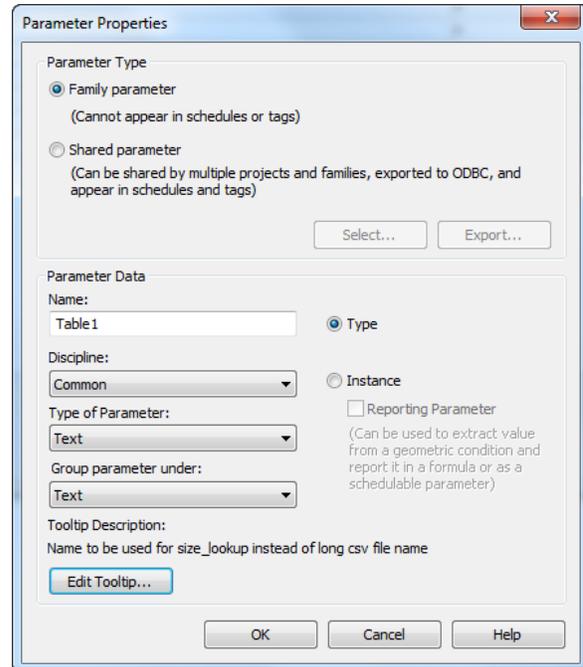
If you're doing an update to your csv file you need to repeat the import process and overwrite the table within the family. You can even import more than one table into the same family if there is a need to do that. If you get a family which has a lookup table included you can also use the export to extract the csv file from family and make adjustments.

The Import now is finished.

### Using the lookup table in the family

To use the imported csv file in your family there is one short hint upfront to make it easier to change from one lookup table to another or to simplify the name: Create a new text parameter with a short and simple name like *Lookup* or *Table1*.

In this case you can define either an instance or a type parameter. E.g. you can use different lookup tables for different types.



Now fill the Value of *Table1* with the name of the lookup table. *ExampleValues* in this exercise:

Parameter	Value
<b>Data</b>	
Table1	ExampleValues

This enables you to use *Table1* for the lookup formula.

## Use the parameters in your family

In order to use the lookup table you have imported into your family, you need to have parameters that are driven by the lookup table and you need to have knowledge about the syntax of the lookup formula.

*Be aware that lookup tables are only working with instance parameters*

### Create Parameters

As you should have thought about what you're going to achieve with your family you will already have in place the parameters you need to drive your geometry. In this easy exercise we will need three parameters:

- Width
- Length
- Thickness

All of those parameters are going to be on discipline: *common* and parametertype: *length* and **need to be instance Parameters**

Remember: We had to define the Parametertype already when creating the lookup table. So make sure that those give a match!

Now your Parameters should look like this:

Parameter	Value
<b>Dimensions</b>	
length (default)	0.0
width (default)	0.0
thickness (default)	0.0

### The lookup formula

This is going to be the most complicated part of this class. This Formula needs to be put into the formula column of your family types dialog and will give back the value.

We're going to start with the syntax of the formula and the example for our exercise down below.

=size_lookup	(	LookupTableName	LookupColumn	DefaultIfNotFound	LookupValue1	LookupValue2	)
=size_lookup	(	Table1,	"Output1",	15,	length,	width	)
	(	Table1,	"Output1",	=length/width*10,	Length,	Width	)

Let's go through the single parts step by step:

=size_lookup	This is telling Revit that it should deal with lookup tables at this point
(	Opens the term
LookupTableName	You're going to use the name of the lookup table you defined previously. <i>Table1</i> in our exercise



LookupColumn	Name of the column that you want to get your value from. Put this Name into quotation marks, as this could include spaces.
DefaultifNotFound	This is the Value or Formula that is used if you don't get a match within the table. E.g. combination of length and width is not defined in the table.
LookupValue1	Here you have to insert the ParameterName from the Revit-Family you want to search for in the Table. Please Note that this is always going to look into the <b>second</b> column of the lookup table (column B in Excel)
LookupValue2	Here you have to insert the ParameterName from the Revit-Family you want to search for in the Table. Please Note that this is always going to look into the <b>third</b> column of the lookup table (column C in Excel)
)	Closes the term

As mentioned before you can have one LookupValue or you can have multiple LookupValues which will then be counted up and always advance one column in your Lookup Table.

In our exercise the formula should look like this:

`= size_lookup(Table1, "Output1", length / width * 10 mm, length, width)`

A	B	C	D
	Input1##length##millimeters	Input2##length##millimeters	Output1##length##millimeters
1	1000	1000	15
2	1200	1000	16
3	1000	1200	16
4	1200	1200	18
5	1200	1400	20

This means:

- If we have a length of 1200 and a width of 1000, the formula will return the value 16 (as this matches row 2)
- If we have a length of 1200 and a width of 1200, the formula will return the value 18 (as this matches row 4)
- If we have a length of 900 and a width of 1000, the formula will return the value 9 (as this doesn't match any row and therefore it calculates  $900/1000*10$ )

You can now play around with what we've got. Type in different length or width values and see the results on the thickness.



Now your Family Types should look like this and give you back the right results:

Parameter	Value	Formula
<b>Dimensions</b>		
length (default)	1200.0	=
width (default)	1000.0	=
thickness (default)	16.0	= size_lookup(Table1, "Output1", length / width * 10 mm, length, width)
<b>Data</b>		
Table1	ExampleValues	=

For Reference on lookup table syntax have a look at the [Revit 2016 Online Help](#)

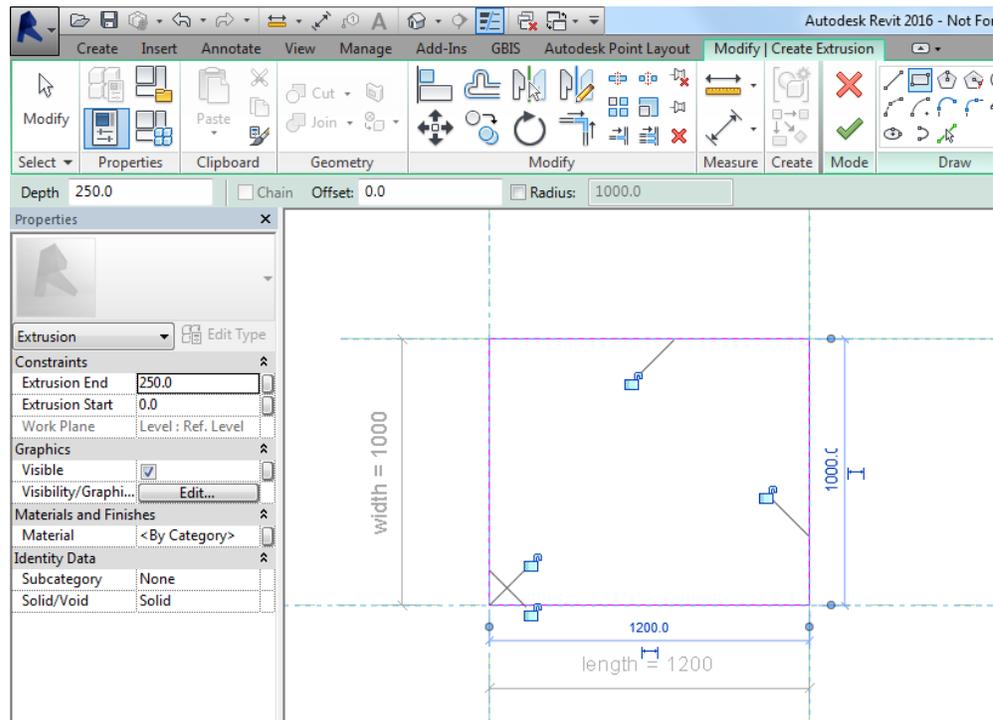
### Parameters on the Geometry

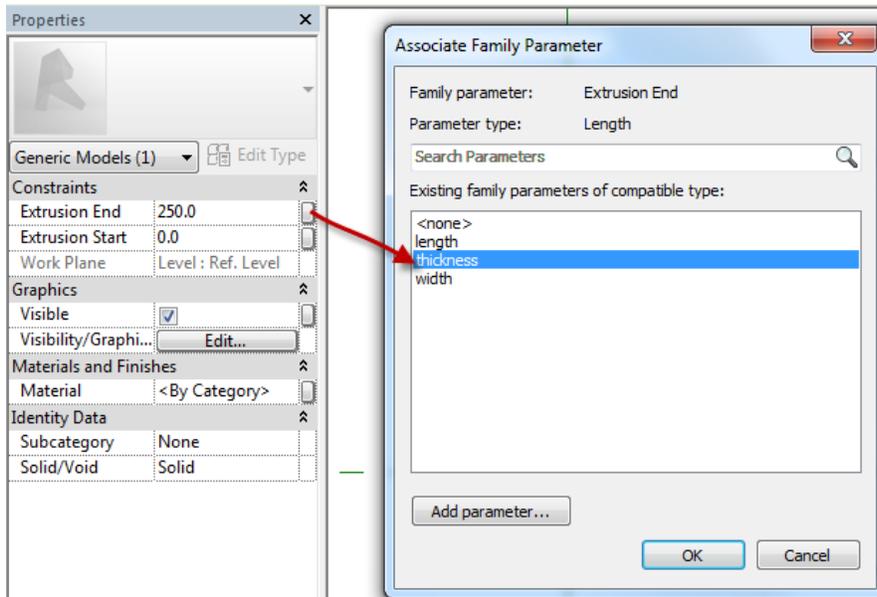
If you have used parameters to steer your geometry before, you're good to go. Do it the same way you did before.

In our exercise you should create an extrusion and define length and width on it.

The recommendation is to use reference lines to steer your geometry instead of putting the dimension into the sketch itself.

Close the locks to make sure the geometry is following your dimensions.





After finishing the sketch, assign Extrusion End to your *thickness* Parameter.

You can now go on and add more parameters to the Family and play around with your lookup table if you want to.

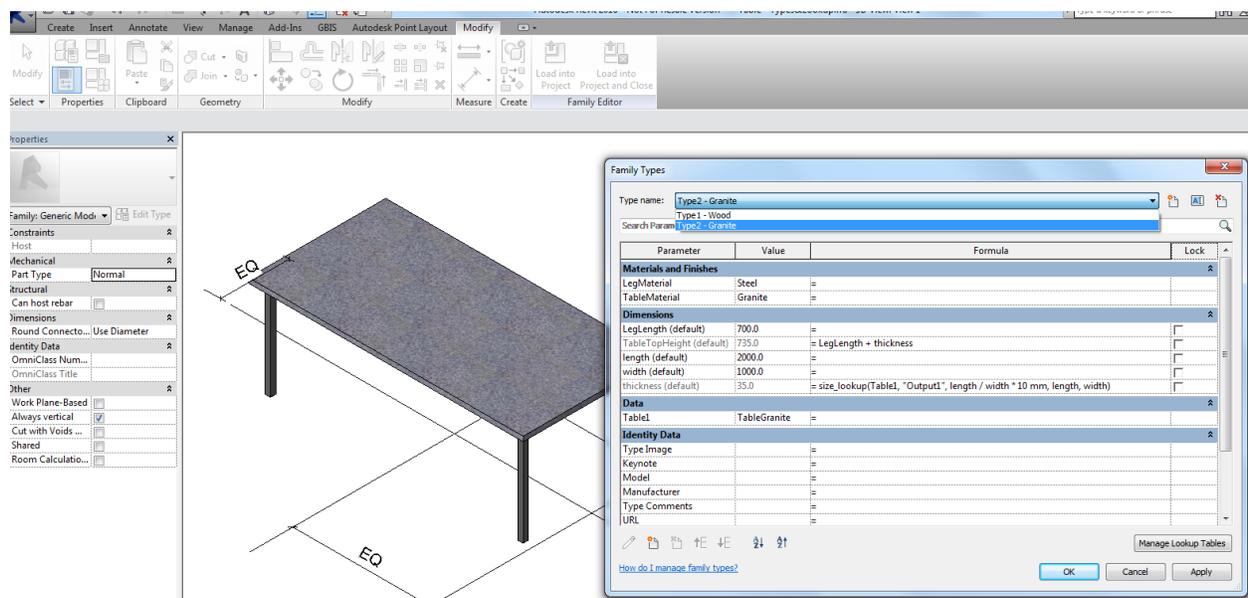
## Use cases and limitations of lookup tables

You have learned how to create a lookup table and what needs to be in there. You then created a family and imported the lookup table. This enables you to get values for parameters according to input parameters that don't follow any linear rule.

### Lookup table usecases

#### Simple Table Family

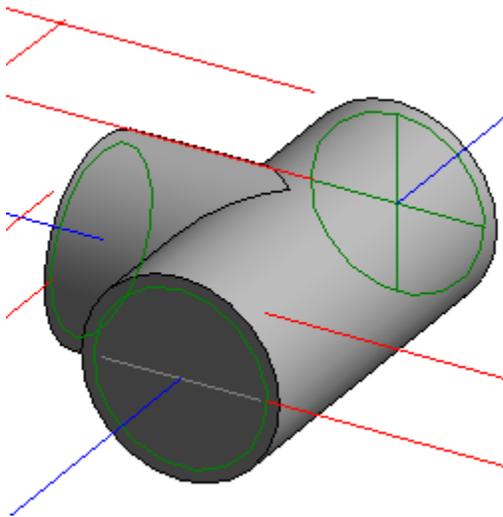
For your reference and to get a better Impression of what you can do with lookup tables, I've added a [sample Family \(Table - Types&Lookup.rfa\)](#) where I mixed Types and Lookup tables.



If you have a look at this example you will see that Material & used lookup table is changing by using another type. So for each type I've loaded another lookup table which enables the family to have different thickness of plate for the same width & length of the table.

#### MEP Usecases

The MEP Domain is where lookup tables come from as there are many parts not following linear rules. Have a look at a T-Piece (Go to your Revit Content and open `\Pipe\Fittings\Generic\Tee - Generic.rfa`)



This is one example where you have lots of combinations for the three MEP connector dimensions. In addition, e.g. the length of the T-Piece might be the same for 3 dimensions, then jump to another length for another 3 dimensions.

Why not do it with lots of different family types? Because you won't be able to adjust the partsize by changing to connected pipe! Instance parameters for diameter allow to hand over the diameter from each connected pipe to the T-Piece, search for a match within the lookup table and give back the right geometry instantly. As you know how to extract the lookup table from the family. Go ahead and try to understand what's going on in the Family

### Limitations

It's not really limitations, it's more about what you can do and what you can't do with lookup tables. So here again some basic rules for Lookup tables:

- Can be used only with instance parameters
- Only working with number values (number, length, area, volume, ....)
- Need to be defined properly (Syntax, Structure, column definition)
- Formula within instance parameter needs to be correct

### Summary

Lookup tables are a powerful way of steering your geometry by using a spreadsheet view to create your values. This allows to get values that are not able to be calculated through a certain formula. Unlike type based families they are able to adjust their geometry according to input from other objects within the projects e.g. connected pipes or global parameters (Revit 2016 R2 Release).

## Appendix

### Changes on lookup table functionality

#### **Revit Versions before Revit 2015:**

.csv Files needed to be in one specific Folder that was defined in Revit.ini

Families with lookup tables didn't get the right values if .csv file wasn't at this location

```
[Directories]
ProjectPath=%USERPROFILE%\Documents\
ImportLineWeightsNameDWG=C:\Program Files\Autodesk\Revit 2015\Data\i
MaterialLibraryFiles=..\Data\Rendering
IESFileLocation=C:\ProgramData\Autodesk\RVT 2015\IES\
LookupTableLocation=C:\ProgramData\Autodesk\RVT 2015\Lookup Tables\
ExternalParameters=..\..\..\Users\goehrinm\AppData\Roaming\plus4revi
ExportLayersNameDGN=
```

**Revit 2015:** .csv Files could be included into Revit Families which enabled easy sharing of Families using lookup tables and increased performance.

**Revit 2015 R2 Release:** Lookup Tables are available for all domains (previously only MEP)

#### Links

Revit Online Help – Lookup Tables: <http://help.autodesk.com/view/RVT/2016/ENU/?guid=GUID-91270AEF-225A-49D7-BF84-1F44D1E3E216>

Revit Online Help – CSV File Structure: <http://help.autodesk.com/view/RVT/2016/ENU/?guid=GUID-DD4D26EB-0827-4EDB-8B1F-E591B9EA8CA0>

Revit Online Help – Create Type Cataloge (gives you some more usable Units)  
<http://help.autodesk.com/view/RVT/2016/ENU/?guid=GUID-FFA71D72-D4C5-416D-BF65-1757657C3CE9>

